Complete Summary

GUIDELINE TITLE

Thrombolysis and adjunctive therapy in acute myocardial infarction: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy.

BIBLIOGRAPHIC SOURCE(S)

Menon V, Harrington RA, Hochman JS, Cannon CP, Goodman SD, Wilcox RG, Schunemann HJ, Ohman EM. Thrombolysis and adjunctive therapy in acute myocardial infarction: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004 Sep;126(3 Suppl):549S-75S. [152 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Ohman EM, Harrington RA, Cannon CP, Agnelli G, Cairns JA, Kennedy JW. Intravenous thrombolysis in acute myocardial infarction. Chest 2001 Jan;119(1 Suppl):253S-277S.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Acute myocardial infarction (MI)

GUIDELINE CATEGORY

Treatment

CLINICAL SPECIALTY

Cardiology
Critical Care
Emergency Medicine
Family Practice
Internal Medicine

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

- To provide an evidence-based set of recommendations for the use of fibrinolytic therapy in acute myocardial infarction (MI)
- To focus on approved agents and the randomized trials that have led to their widespread utilization
- To discuss the utility of adjunctive antithrombotic therapies, such as aspirin, clopidogrel, intravenous (IV) unfractionated heparin (UFH), low molecular weight heparin (LMWH), glycoprotein (GP) IIb/IIIa inhibitors, and direct thrombin inhibitors (DTIs)
- To detail limitations and complications associated with fibrinolytic therapy
- To compare outcomes with thrombolysis and primary angioplasty (although a complete review of the two different reperfusion strategies is beyond the scope of this document)

TARGET POPULATION

Patients with acute myocardial infarction (MI)

INTERVENTIONS AND PRACTICES CONSIDERED

Treatment

1. Intravenous (IV) fibrinolytic therapy
    - Streptokinase
    - Anistreplase
    - Alteplase
    - Reteplase
    - Tenecteplase

    Note: Urokinase, single-chain urokinase-type plasminogen activator, lanoteplase, and staphylokinase were considered but not recommended.

2. Aspirin in combination with fibrinolytic therapy
3. Clopidogrel in combination with fibrinolytic therapy
4. Unfractionated heparin (UFH) or low molecular weight heparin (LMWH) in combination with fibrinolytic therapy

5. Direct thrombin inhibitors (DTIs) in combination with fibrinolytic therapy (recommended only as an alternative to heparin in patients with suspected heparin-induced thrombocytopenia)
    - Hirudin with tissue plasminogen activator (tPA)
    - Bivalirudin with streptokinase

    Note: Adjunctive therapy with other direct thrombin inhibitors, such as desirudin, and lepirudin were considered but not recommended. In addition, adjunctive therapy with glycoprotein (GP) IIb/IIIa receptor blockers (abciximab) was considered but not recommended.

Evaluation of Therapeutic Efficacy

1. Angiographic assessment of epicardial coronary flow
2. Electrocardiogram (ECG) evaluation
3. Activated partial thromboplastin time (aPTT)

MAJOR OUTCOMES CONSIDERED

- Effectiveness and safety of fibrinolytic therapy for acute myocardial infarction as defined by the following:
    - Rates of mortality
    - Rates of intracranial hemorrhage or other major bleeding
    - Patency of infarct-related artery
    - Incidence of recurrent ischemia
    - Recurrence of myocardial infarction
- Cost-effectiveness

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Process of Searching for Evidence

Defining the clinical question provided the framework for formulating eligibility criteria that guided the search for relevant evidence. Prior to searching for the evidence, methodological experts and librarians reviewed each question to ensure that the librarians could derive a comprehensive search strategy.

In specifying eligibility criteria, authors not only identified patients, interventions, and outcomes, but also methodological criteria. For most therapeutic studies, authors restricted eligibility to randomized controlled trials (RCTs).

For many questions, RCTs did not provide sufficient data, and article authors also included observational studies. This was also true when randomized trials were

not the most appropriate design to use for addressing the research question. In particular, randomized trials are not necessarily the best design to understand risk groups (e.g., the baseline or expected risk of a given event for certain subpopulations). Because there are no interventions examined in questions about prognosis, one replaces interventions by the exposure, which is time.

Identifying the Evidence

To identify the relevant evidence, a team of librarians at the University at Buffalo conducted comprehensive literature searches. For each question the authors provided, the librarians developed sensitive (but not specific) search strategies, including all languages, and conducted separate searches for systematic reviews, RCTs, and, if applicable, observational studies. The librarians searched the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effectiveness and Cochrane Register of Controlled Trial, the ACP Journal Club, MEDLINE, and Embase for studies published between 1966 and June 2002 in any language. To filter MEDLINE and Embase search results for RCT evidence, the librarians used the search strategy developed by the Cochrane Collaboration (full strategy available in Appendix online at: http://www.chestjournal.org/content/vol126/3_suppl_1).

For observational studies, they restricted their searches to human studies. Searches were not further restricted in terms of methodology. While increasing the probability of identifying all published studies, this sensitive approach resulted in large number of citations for many of the defined clinical questions. Therefore, trained research assistants screened the citation list developed from the search and removed any apparently irrelevant citations. These irrelevant citations included press news, editorials, narrative reviews, single case reports, animal studies (any nonhuman studies), and letters to the editor. Authors included data from abstracts of recent meetings if reporting was transparent and all necessary data for the formulation of a recommendation were available. The guideline developers did not explicitly use Internet sources to search for research data.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

The rating scheme framework captures the trade-off between benefits and risks (1 or 2) (and the methodological quality of the underlying evidence (A, B, C+, or C). See "Rating Scheme for the Strength of the Recommendations."

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Summarizing Evidence

The electronic searches also included searching for systematic reviews. If authors were satisfied with a recent high-quality systematic review, evidence from that review provided a foundation for the relevant recommendation.

Pooled analyses from high-quality systematic reviews formed, wherever possible, the evidence base of the recommendations. Pooling offers the advantage of obtaining more precise estimates of treatment effects and allows for a greater generalizability of results. However, pooling also bears the risk of spurious generalization. In general, the summary estimates of interest were the different types of outcomes conveying benefit and downsides (i.e., risk, burden, and cost).

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Consensus Development Conference)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The strength of any recommendation depends on the following two factors: the trade-off between the benefits and the risks, burdens, and costs; and the strength of the methodology that leads to the treatment effect. The guideline developers grade the trade-off between benefits and risks in the two categories: 1, in which the trade-off is clear enough that most patients, despite differences in values, would make the same choice; and 2, in which the trade-off is less clear, and individual patients´ values will likely lead to different choices.

When randomized trials provide precise estimates suggesting large treatment effects, and the risks and costs of therapy are small, treatment for average patients with compatible values and preferences can be confidently recommended.

If the balance between benefits and risks is in doubt, methodologically rigorous studies providing Grade A evidence and recommendations may still be weak (Grade 2). Uncertainty may come from less precise estimates of benefit, harm, or costs, or from small effect sizes.

There is an independent impact of validity and consistency, and the balance of positive and negative impacts of treatment on the strength of recommendations. In situations in which there is doubt about the value of the trade-off, any recommendation will be weaker, moving from Grade 1 to Grade 2.

Grade 1 recommendations can only be made when there is a relatively clear picture of both the benefits and the risks, burdens, and costs, and when the balance between the two clearly favors recommending or not recommending the

intervention for the typical patient with compatible values and preferences. A number of factors can reduce the strength of a recommendation, moving it from Grade 1 to Grade 2. Uncertainty about a recommendation to treat may be introduced if the following conditions apply: (1) the target event that is trying to be prevented is less important (confident recommendations are more likely to be made to prevent death or stroke than asymptomatic deep vein thrombosis); (2) the magnitude of risk reduction in the overall group is small; (3) the probability of the target event is low in a particular subgroup of patients; (4) the estimate of the treatment effect is imprecise, as reflected in a wide confidence interval (CI) around the effect; (5) there is substantial potential harm associated with therapy; or (6) there is an expectation for a wide divergence in values even among average or typical patients. Higher costs would also lead to weaker recommendations to treat.

The more balanced the trade-off between benefits and risks, the greater the influence of individual patient values in decision making. Virtually all patients, if they understand the benefits and risks, will take aspirin after experiencing a myocardial infarction (MI) or will comply with prophylaxis to reduce the risk of thromboembolism after undergoing hip replacement. Thus, one way of thinking about a Grade 1 recommendation is that variability in patient values is unlikely to influence treatment choice in average or typical patients.

When the trade-off between benefits and risks is less clear, individual patient values may influence treatment decisions even among patients with average or typical preferences.

Grade 2 recommendations are those in which variation in patient values or individual physician values will often mandate different treatment choices, even among average or typical patients. An alternative, but similar, interpretation is that a Grade 2 recommendation suggests that clinicians conduct detailed conversations with patients to ensure that their ultimate recommendation is consistent with the patient's values.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
1A	Clear	Randomized controlled trials (RCTs) without important limitations	Strong recommendation; can apply to most patients in most circumstances without reservation
1C+	Clear	No RCTs, but strong RCT	Strong recommendation;

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
		results can be unequivocally extrapolated, or overwhelming evidence from observational studies	can apply to most patients in most circumstances
1B	Clear	RCTs with important limitations (inconsistent results, methodological flaws*)	Strong recommendation; likely to apply to most patients
1C	Clear	Observational studies	Intermediate-strength recommendation; may change when stronger evidence is available
2A	Unclear	RCTs without important limitations	Intermediate-strength recommendation; best action may differ depending on circumstances or patients' or societal values
2C+	Unclear	No RCTs, but strong RCT results can be unequivocally extrapolated, or overwhelming evidence from observational studies	Weak recommendation; best action may differ depending on circumstances or patients' or societal values
2B	Unclear	RCTs with important limitations	Weak recommendation; alternative

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
		(inconsistent results, methodological flaws*)	approaches likely to be better for some patients under some circumstances
2C	Unclear	Observational studies	Very weak recommendation; other alternatives may be equally reasonable

*These situations include RCTs with both lack of blinding and subjective outcomes, where the risk of bias in measurement of outcomes is high, or RCTs with large loss to follow-up.

COST ANALYSIS

While conference participants agreed that recommendations should reflect economic considerations, incorporating costs is fraught with difficult challenges. For most recommendations, formal economic analyses are unavailable. Even when analyses are available, they may be methodologically weak or biased. Furthermore, costs differ radically across jurisdictions, and even sometimes across hospitals within jurisdictions.

Because of these challenges, the guideline developers consider economic factors only when the costs of one therapeutic option over another are substantially different within major jurisdictions in which clinicians make use of these recommendations. As a result, in jurisdictions in which resource constraints are severe, alternative allocations may serve the health of the public far better than some of the interventions that are designated as Grade 1A. This will likely be true for all less industrialized countries and, with the increasing promotion of expensive drugs with marginal benefits, may be increasingly true for wealthier nations. Furthermore, recommendations change (either in direction or with respect to grade) only when the guideline developers believe that costs are high in relation to benefits. Instances in which costs have influenced recommendations are labeled in the "values and preferences" statements associated with the recommendation.

Cost-effectiveness of Alteplase in Comparison to Streptokinase

A formal cost-effectiveness analysis was incorporated into the Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO-I) protocol as a substudy in the United States and Canada. At 1 year, alteplase-treated patients had both higher costs ($2,845) and higher survival (an absolute 1.1% higher rate, or 11

more patients surviving per 1,000 patients treated) compared with streptokinase-treated patients. The incremental cost-effectiveness ratio was $32,678 per year of life saved. The cost-effectiveness of alteplase was more favorable in patients with anterior myocardial infarction (MI) but less favorable in those with inferior myocardial infarction and of young age.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The guideline authors formulated draft recommendations prior to the conference that served as the foundation for authors to work together and critique the recommendations. Drafts of all articles including draft recommendations were available for review during the conference. A representative of each article presented potentially controversial issues in their recommendations at plenary meetings. Article authors met to integrate feedback, to consider related recommendations in other articles, and to revise their own guidelines accordingly. Authors continued this process after the conference until they reached agreement within their groups and with other author groups who had provided critical feedback. Finally, the editors of this supplement harmonized the articles and resolved remaining disagreements through facilitated discussion.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The rating scheme is defined at the end of the "Major Recommendations" field.

Patients with Acute Myocardial Infarction (MI): Thrombolysis

Thrombolysis with Streptokinase, Tissue Plasminogen Activator (tPA), Anistreplase, Reteplase and Tenecteplase

1. For patients with ischemic symptoms characteristic of acute MI of ≤12 hours in duration, and ST-segment elevation or left bundle-branch block (of unknown duration) on electrocardiography (ECG), the guideline developers recommend administration of any approved fibrinolytic agent (Grade 1A).
2. The guideline developers recommend the use of streptokinase, anistreplase, alteplase, reteplase, or tenecteplase (all Grade 1A).
3. For patients with symptom duration ≤6 hours, the guideline developers recommend the administration of alteplase or tenecteplase over streptokinase (Grade 1A).
4. For patients with known allergy or sensitivity to streptokinase, the guideline developers recommend alteplase, reteplase, or tenecteplase (Grade 1A).
5. For patients with recurrent acute MI, the guideline developers suggest clinicians do not use repeat administration of streptokinase (Grade 2C).

6. For patients with ischemic symptoms characteristic of acute MI of ≤12 hours in duration and 12-lead ECG findings consistent with a true posterior MI, the guideline developers suggest fibrinolytic therapy (Grade 2C).
7. For high-risk patients with ongoing symptoms characteristic of acute MI or hemodynamic compromise and duration of 12 to 24 hours who have ST elevation or left bundle-branch block, the guideline developers suggest administration of intravenous (IV) fibrinolytic therapy (Grade 2B).
8. In health-care settings where prehospital administration of fibrinolytic therapy is feasible and primary angioplasty is not available, the guideline developers recommend prehospital administration of fibrinolytic therapy only (Grade 1A).
9. For patients with acute MI who are candidates for fibrinolytic therapy, the guideline developers recommend administration within 30 minutes of arrival to the hospital or first contact with the health-care system (Grade 1A).
10. In patients with any history of intracranial hemorrhage (ICH), closed head trauma, or ischemic stroke within past 3 months, the guideline developers recommend against administration of fibrinolytic therapy (Grade 1C+).

Adjunctive Treatment with Antithrombotic Agents in Patients Receiving Fibrinolysis for Acute MI

Adjunctive Treatment with Aspirin

1. For patients with acute ST-elevation MI, whether or not they receive fibrinolytic therapy, the guideline developers recommend aspirin, 160 to 325 mg orally (po), at initial evaluation by health-care personnel followed by indefinite therapy, 75 to 162 mg/day po (both Grade IA).

   Note: Please refer to the National Guideline Clearinghouse (NGC) summary of the American College of Chest Physicians (ACCP) guideline Antithrombotic Therapy for Coronary Artery Disease for more information on this topic.

Adjunctive Treatment with Clopidogrel

1. In patients who are allergic to aspirin, the guideline developers suggest administration of clopidogrel with a loading dose of 300 mg and a maintenance dose of 75 mg/day as an alternative therapy to aspirin (Grade 2C).

Adjunctive Treatment with Unfractionated Heparin (UFH)

1. For patients receiving streptokinase, the guideline developers suggest administration of either IV UFH, 5,000-U bolus, followed by 1,000-U/hour for patients >80 kg, 800 U/hour for <80 kg with a target activated partial thromboplastin time (aPTT) of 50 to 75 seconds (Grade 2C), or subcutaneous (SC) UFH, 12,500 U every 12 hours for 48 hours (Grade 2A).
2. For all patients at high risk of systemic or venous thromboembolism (anterior MI, pump failure, previous embolus, atrial fibrillation, or left ventricular thrombus), the guideline developers recommend administration of IV UFH while receiving streptokinase (Grade 1C+).
3. For patients receiving alteplase, tenecteplase, or reteplase for fibrinolysis in acute MI, the guideline developers recommend administration of weight-

adjusted heparin (60 U/kg bolus for a maximum of 4,000 U) followed by 12 U/kg/hour (1,000 U/hour maximum) adjusted to maintain an aPTT 50 to 75 seconds for 48 hours (Grade 1C).

Adjunctive Treatment with Low-Molecular-Weight Heparin (LMWH)

1. For patients aged ≤75 years with preserved renal function (creatinine ≤2.5 mg/dL in male and ≤2.0 mg/dL in female patients), the guideline developers suggest use of enoxaparin (30-mg bolus IV followed by 1 mg/kg SC every 12 hours) with tenecteplase up to 7 days (Grade 2B).

Adjunctive Therapy with Glycoprotein (GP) IIb/IIIa Receptor Blockers

1. The guideline developers recommend against the combination of standard-dose abciximab and half-dose reteplase or half-dose tenecteplase with low-dose IV UFH over standard-dose reteplase or tenecteplase (Grade 1B).
2. The guideline developers suggest clinicians not use the combination of streptokinase and any GP IIb/IIIa inhibitor (Grade 2B).

Adjunctive Therapy with Direct Thrombin Inhibitors

1. For patients with acute ST-elevation MI treated with streptokinase, the guideline developers suggest clinicians do not use bivalirudin routinely (Groups 2A).
2. For patients with known or suspected heparin-induced thrombocytopenia (HIT) who are receiving fibrinolytic therapy, the guideline developers recommend administration of hirudin with tPA (Grade 1A) and recommend bivalirudin with streptokinase (Grade 2A).

Definitions

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
1A	Clear	Randomized controlled trials (RCTs) without important limitations	Strong recommendation; can apply to most patients in most circumstances without reservation
1C+	Clear	No RCTs, but strong RCT results can be unequivocally extrapolated, or overwhelming	Strong recommendation; can apply to most patients in most circumstances

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
		evidence from observational studies	
1B	Clear	RCTs with important limitations (inconsistent results, methodological flaws*)	Strong recommendation; likely to apply to most patients
1C	Clear	Observational studies	Intermediate-strength recommendation; may change when stronger evidence is available
2A	Unclear	RCTs without important limitations	Intermediate-strength recommendation; best action may differ depending on circumstances or patients' or societal values
2C+	Unclear	No RCTs, but strong RCT results can be unequivocally extrapolated, or overwhelming evidence from observational studies	Weak recommendation; best action may differ depending on circumstances or patients' or societal values
2B	Unclear	RCTs with important limitations (inconsistent results, methodological flaws*)	Weak recommendation; alternative approaches likely to be better for some patients under some

Grade of Recommendation	Clarity of Risk/Benefit	Methodological Strength of Supporting Evidence	Implications
			circumstances
2C	Unclear	Observational studies	Very weak recommendation; other alternatives may be equally reasonable

*These situations include RCTs with both lack of blinding and subjective outcomes, where the risk of bias in measurement of outcomes is high, or RCTs with large loss to follow-up.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of fibrinolytic therapy in acute myocardial infarction (MI) has been demonstrated to have a statistically significant mortality benefit over placebo

POTENTIAL HARMS

- The main complication of fibrinolytic therapy is bleeding, with the most dreaded complication being intracranial hemorrhage (ICH).
- The excess stroke risk associated with fibrinolytic therapy largely is attributable to the excess risk of ICH.

Subgroups Most Likely to be Harmed

- Several patient characteristics are associated with a higher risk of ICH. Table 9 in the original guideline document summarizes predictors of ICH after

fibrinolysis for acute myocardial infarction (MI), the highest predictor being advanced age.
- Several patient characteristics (age, Killip class, and infarct location) are associated with higher 30-day mortality.

CONTRAINDICATIONS

CONTRAINDICATIONS

The guideline developers recommend against administration of fibrinolytic therapy in patients with any history of intracranial hemorrhage (ICH), closed head trauma, or ischemic stroke within past 3 months.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Interpreting the Recommendations

Clinicians, third-party payers, institutional review committees, or the courts should not construe these guidelines in any way as absolute dictates. In general, anything other than a Grade 1A recommendation indicates that the article authors acknowledge that other interpretations of the evidence, and other clinical policies, may be reasonable and appropriate. Even Grade 1A recommendations will not apply to all circumstances and all patients. For instance, the guideline developers have been conservative in their considerations of cost and have seldom downgraded recommendations from Grade 1 to Grade 2 on the basis of expense. As a result, in jurisdictions in which resource constraints are severe, alternative allocations may serve the health of the public far better than some of the interventions that we designate Grade 1A. This will likely be true for all less industrialized countries and, with the increasing promotion of expensive drugs with marginal benefits, may be increasingly true for wealthier nations.

Similarly, following Grade 1A recommendations will at times not serve the best interests of patients with atypical values or preferences or of those whose risks differ markedly from those of the usual patient. For instance, consider patients who find anticoagulant therapy extremely aversive, either because it interferes with their lifestyle (e.g., prevents participation in contact sports) or because of the need for monitoring. Clinicians may reasonably conclude that following some Grade 1A recommendations for anticoagulation therapy for either group of patients will be a mistake. The same may be true for patients with particular comorbidities (e.g., a recent gastrointestinal bleed or a balance disorder with repeated falls) or other special circumstances (e.g., very advanced age) that put them at unusual risk.

The guideline developers trust that these observations convey their acknowledgment that no recommendations or clinical practice guidelines can take into account the often compelling and unique features of individual clinical circumstances. No clinician, and no body charged with evaluating a clinician´s actions, should attempt to apply our recommendations in a rote or blanket fashion.

Limitations of Guideline Development Methods

The limitations of these guidelines include the possibility that some authors followed this methodology more closely than others, although the development process was centralized and supervised by the editors. Second, it is possible that the guideline developers missed relevant studies despite the comprehensive searching process. Third, the guideline developers did not centralize the methodological evaluation of all studies to facilitate uniformity in the validity assessments of the research incorporated into these guidelines. Fourth, if high-quality meta-analyses were unavailable, the guideline developers did not statistically pool primary study results using meta-analysis. Finally, sparse data on patient preferences and values, resources, and other costs represent additional limitations that are inherent to most guideline development methods.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Guideline Implementation Strategies

A full review of implementation strategies for practice guidelines is provided in the companion document titled "Antithrombotic and Antithrombolytic Therapy: From Evidence to Application." The review suggests that there are few implementation strategies that are of unequivocal, consistent benefit, and that are clearly and consistently worth resource investment. The following is a summary of the recommendations (see "Major Recommendations" for a definition of the recommendation grades).

To encourage uptake of guidelines, the guideline developers recommend that appreciable resources be devoted to distribution of educational material (Grade 2B).

They also suggest that:

- Few resources be devoted to educational meetings (Grade 2B)
- Few resources be devoted to educational outreach visits (Grade 2A)
- Appreciable resources be devoted to computer reminders (Grade 2A)
- Appreciable resources be devoted to patient-mediated interventions to encourage uptake of the guidelines (Grade 2B)
- Few resources be devoted to audit and feedback (Grade 2B)

IMPLEMENTATION TOOLS

Patient Resources
Personal Digital Assistant (PDA) Downloads
Quick Reference Guides/Physician Guides
Resources
Slide Presentation
Tool Kits

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Menon V, Harrington RA, Hochman JS, Cannon CP, Goodman SD, Wilcox RG, Schunemann HJ, Ohman EM. Thrombolysis and adjunctive therapy in acute myocardial infarction: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004 Sep;126(3 Suppl):549S-75S. [152 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2001 Jan (revised 2004 Sep)

GUIDELINE DEVELOPER(S)

American College of Chest Physicians - Medical Specialty Society

SOURCE(S) OF FUNDING

Funding was provided through an unrestricted educational grant by AstraZeneca LP, Aventis Pharmaceuticals, GlaxoSmithKline, Bristol-Myer Squibb/Sanofi-Synthelabo Partnership, and Organon Sanofi-Synthelabo LLC.

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American College of Chest Physicians Consensus Panel on Antithrombotic and Thrombolytic Therapy

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Dr. Menon has received honoraria from Roche Inc.

Dr. Cannon, through the Department of Medicine of Brigham and Women´s Hospital, currently receives research grant support from Bristol-Myers Squibb, Merck, and Sanofi-Synthelabo. He is a consultant to Asahi Chemical Company, Bayer, Pfizer Limited, Vertex, Medicines Company, Ortho-Clinical Diagnostics, AstraZeneca, GlaxoSmithKline. Dr. Cannon is on the speaker bureau of Aventis, Bristol-Myers Squibb, Centocor, Eli Lilly, Genentech, Merck, Millennium, Sanofi-Synthelabo. He has received honoraria for preparation of educational materials from Best Med, Discovery East, Excerpta Medica, Medical Decision Point, and NCME.

Dr. Robert Harrington has received research grants through the Duke Clinical Research Institute from Aventis, AstraZeneca, Millennium, Schering, Merck, Lilly, Centocor, Roche, The Medicines Company, BMS, Sanofi, Glaxo, Daiichi.

Dr. Goodman has received research funding and has received honoraria for his participation on advisory boards and/or as a speaker at educational events from AstraZeneca, Aventis Pharma, Bayer, Biovail, Boehringer Ingelheim, BrystolMyers Squibb, CanAm, Centocor, Daiichi, Eli Lilly, Fournier Pharma, Hoffman-La Roche, Key Schering/Schering Plough, Millenium, Merck, Novartis, Sanofi Synthelabo, Servier, and Solvay.

Dr. Wilcox has received research funding from AstraZeneca, Aventis and Bristol-Myers Squibb.

Dr. Ohman has received research grants from the following organizations: BMS, Sanofi, Millennium, Schering-Plough, Aventis, and Berlex.

Dr. Schünemann has received research funding from AstraZeneca, Boehringer Ingelheim, Pfizer, and Amgen Inc. He has received honoraria and consultant fees from AstraZeneca, Boehringer Ingelheim, and Amgen that were deposited into research accounts at the University of Buffalo and McMaster University.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Ohman EM, Harrington RA, Cannon CP, Agnelli G, Cairns JA, Kennedy JW. Intravenous thrombolysis in acute myocardial infarction. Chest 2001 Jan;119(1 Suppl):253S-277S.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Chest - The Cardiopulmonary and Critical Care Journal.

Print copies: Available from the American College of Chest Physicians, Products and Registration Division, 3300 Dundee Road, Northbrook IL 60062-2348.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Evidence-based guidelines. Northbrook, IL: ACCP, 2004 Sep.
- Methodology for guideline development for the Seventh American College of Chest Physicians Conference on Antithrombotic and Thrombolytic Therapy. Northbrook, IL: ACCP, 2004 Sep.
- Applying the grades of recommendation for antithrombotic and thrombolytic therapy: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Northbrook, IL: ACCP, 2004 Sep.

- Hemorrhagic complications of anticoagulant treatment: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Northbrook, IL: ACCP, 2004 Sep.
- Antithrombotic and thrombolytic therapy: from evidence to application: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Northbrook, IL: ACCP, 2004 Sep.
- Platelet-active drugs: the relationships among dose, effectiveness, and side effects: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Northbrook, IL: ACCP, 2004 Sep.

Electronic copies: Available from the Chest - The Cardiopulmonary and Critical Care Journal Web site.

Print copies: Available from the American College of Chest Physicians (ACCP), Products and Registration Division, 3300 Dundee Road, Northbrook IL 60062-2348.

The following is also available:

- Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy: Evidence-based guidelines; quick reference guide. Northbrook, IL: ACCP, 2004 Sep. Personal Digital Assistant (PDA) download available at ACCP Web site.

Additional implementation tools are also available:

- Clinical resource: antithrombotic and thrombolytic therapy. Northbrook, IL. ACCP, 2004. Ordering information: Available from the ACCP Web site.

PATIENT RESOURCES

The following is available:

- A patient's guide to antithrombotic and thrombolytic therapy. In: Clinical resource: antithrombotic and thrombolytic therapy. Northbrook (IL): American College of Chest Physicians (ACCP). 2004.

Ordering information is available from the ACCP Web site.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This summary was completed by ECRI on July 30, 2001. The information was verified by the guideline developer on October 17, 2001. This NGC summary was

updated by ECRI on December 9, 2004. The updated information was verified by the guideline developer on January 12, 2005.

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Date Modified: 2/21/2005